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LETTERS TO THE EDITOR

Exercise Training After Anterior Q Wave Myocardial Infarction: Importance of Regional Left Ventricular Function and Topography

Jugdutt et al. (1) designed a study to "determine the effect of a standard low level exercise program on left ventricular function and topography in a group of survivors of anterior Q wave acute myocardial infarction. . . ." I was puzzled by the use of the words "standard low level exercise program." Whereas the Canadian Air Force Exercise Program consisting of "11 min of . . . exercise, split equally between calisthenics and a stationary run . . ." may be the standard rehabilitation protocol for low level exercise in Alberta, it is not the standard of care in our hospital-based cardiac rehabilitation program nor is it the standard in California.

The California Society for Cardiac Rehabilitation has developed standards of care that are based on target heart rate or metabolic equivalent level ranges as determined by an entrance treadmill stress test. Emphasis is on gradually increasing duration, as opposed to the authors' protocol of only 11 min of exercise, with increases in repetitions or intensity while keeping the duration constant. Their protocol increases the rate-pressure product and is not recommended for cardiovascular-impaired individuals.

A universally accepted measure of functional aerobic capacity is oxygen uptake ($\dot{V}O_2$), which is measured in milliliters of oxygen per kilogram per minute. The authors never discussed this measure, and instead used the New York Heart Association (NYHA) functional classes. My understanding of the NYHA scale is that class IV is the greatest impairment and class I is no functional impairment. Therefore, I am confused by the authors' results statement that functional class ". . . increased in group 2 (2.3 ± 0.4 versus 2.7 ± 0.3)." In addition, I have not previously seen NYHA classes quantified other than I, II, III or IV and would be interested in knowing what formula was used to determine a functional class of 2.7.

The article generated discussion with our staff, medical director and referring cardiologists. Although we agree with the conclusion of Jugdutt et al. (1) that two-dimensional echocardiography may be a good predictor of patient progress and prognosis in cardiac rehabilitation, we would like to see a similar study done with patients who follow a more standard, low level cardiac rehabilitation protocol.

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Reply

In regard to our article, there are some issues that merit clarification.

1. *Canadian Air Force Exercise Program.* Kushner may feel that it is not a program that complies with the standards set down by the California Society for Cardiac Rehabilitation. It was not our intention to recommend its use to the Society. However, this program has been extensively evaluated by us and others and found to be effective in improving physical fitness in both normal subjects and in patients with heart disease (1–5). Its virtue is that it requires practically no equipment and is particularly suitable for patients who require only a minimal degree of supervision. The program clearly increases the rate-pressure product. We are unaware of a form of exercise that does not have such an effect.

2. *Functional aerobic capacity.* The numbers for New York Heart Association functional class quoted in our article were derived by simply averaging the values for the functional classes. This approach is commonly used to compare functional status in groups of patients. Figure 2 in our paper indicated the trends we observed and we regret any confusion.

3. *Study with standard low level cardiac rehabilitation protocol.* We have completed such a study in a larger group of patients. Although not reported yet, the results confirm the conclusions in our article.

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Silent Defects

I noted with pleasure that the subject index in the December 1988 issue now includes "Silent Defects." This reflects the recent realization by physicians and surgeons dealing with coronary disease that patients may have severe coronary disease without angina (1) and that patients with coronary disease but no angina can have as much benefit from bypass surgery as symptomatic patients (2). The concept that a patient without angina can have important coronary disease and should be dealt with in the same way as a similar

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patient with angina, up to and including revascularization surgery, is not new. Twenty years ago, FitzGibbon of the Canadian Armed Forces presented his work on silent myocardial ischemia and revascularization at the 21st meeting of the Canadian Cardiovascular Society (3).

FitzGibbon had selected 22 men (mean age 42) without angina but with significant coronary disease and myocardial ischemia for Vineberg surgery. That they had significant disease is underlined by the fact that, while waiting for surgery, one patient died and two had a myocardial infarction despite having been free of angina at the time of angiography several weeks earlier. FitzGibbon summarized his ideas at the time well: "Individuals with no symptoms may harbour severe and diffuse coronary atherosclerosis. Their electrocardiograms may show irrefutable evidence of myocardial ischemia after a Master two-step test. They may have grossly abnormal hemodynamic responses to exercise of the type seen specifically in association with myocardial ischemia . . . All this suggests that augmentation of myocardial blood supply should be of great value to patients who have no angina but severe coronary disease. The only proven way this can be achieved is by operation." On the basis of these early results, FitzGibbon has continued to treat patients according to the presence of disease and ischemia rather than symptoms. His experience in sending patients without angina for bypass surgery has been summarized elsewhere (4).

It is gratifying to see that 20 years later we have come to realize that it is the coronary disease and its effect on the myocardium that is important and not the presence or absence of a symptom.

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Ephraim Donoso, Editor

I join Prystowsky (1), Fuster (2) and Dack (3) in their tributes to Ephraim Donoso. They touched on his devotion to the editorship of *Circulation*, which he took over on short notice after the tragic death of Charles Friedberg (3). Although they commented on his scholarly efforts, there is another aspect of Dr. Donoso's editorship—the humane side—that deserves some emphasis.

When he wanted a manuscript to be revised, he made the arguments ever so tactfully and yet so convincingly that his suggestions were always completely followed. If he rejected a manuscript, he always made it sound like a good manuscript that would be worthy of publication somewhere else. Editors of prestigious journals seldom retain many friends, but nobody ever got mad at Ephraim Donoso.

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2. Fuster V. Comments regarding Dr. Ephraim Donoso. J Am Coll Cardiol 1989;13:955–6.
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Correction

In Vorperian et al. (J Am Coll Cardiol 1989;13:637–45), the last line of the Statistical Appendix should read: $P = [1 + \exp(-1.893)]^{-1} = 1.150619]^{-1} = 0.8690$.